Annual Industrial Capabilities Report

to

Congress

February 1998

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EXECUTIVE SUMMARY

Section 2504 of title 10 of the United States Code requires the Secretary of Defense to submit an annual report to the Committee on Armed Services of the Senate and the Committee on National Security of the House of Representatives, by March 1st of each year. This report describes relevant internal guidance issued, the methods and analyses used to identify and address industrial capabilities issues, and each action taken to sustain an essential "at risk" industrial capability.

Introduction

The Department of Defense (DoD) has established policies and procedures, performed analyses, and taken the actions necessary to:

- Leverage the capabilities and competitive pressures of the commercial marketplace.
- Identify and evaluate those industrial and technological capabilities needed to meet current and future defense requirements.
- When necessary, determine the most cost- and mission-effective actions that the Department should take to preserve endangered essential capabilities.
- Respond appropriately within the Department's regular budget, acquisition, and logistics processes.

DoD Policy Guidance

The end of the Cold War has brought dramatic changes to DoD's relationship with the national and world economies. With significant changes in military missions and sharp reductions in defense spending, the Department of Defense must rely on the broader commercial world, and a reshaped defense industry, to equip its forces.

When developing new defense systems, DoD prefers commercial options. The Department will develop military-unique capabilities or components only after it has determined that commercial technologies and products will not meet its requirements. Accordingly, the Department is continuing its efforts to break down the barriers between the commercial and defense industries in order to realize the benefits of civil-military integration in both research and development and manufacturing, increase the pace of innovation in defense systems, and reduce

the cost of such systems. The Department is developing a strategic plan, expected to be completed in early 1998, to achieve greater civil-military integration.

Responding to the declining defense budget, defense firms reduced excess capacity, streamlined processes, and revamped supplier relationships. These actions have led to increased efficiencies, reduced defense product costs, and better value for taxpayers. However, these changes also could have important consequences for the Department's ability to meet its future mission requirements. In 1995 and 1996, the Department formalized policies and procedures necessary to make appropriate judgments about industrial issues and to integrate those judgments into its regular budget, acquisition, and logistics processes. These policies and procedures were summarized in the Department's February 1997 *Annual Industrial Capabilities Report to Congress.*

In 1996, the Department became concerned that one consequence of industry consolidation had been an increase in vertical integration and asked the Defense Science Board to establish a Task Force on Vertical Integration and Supplier Decisions. In 1997, the task force reported that vertical integration did not appear to be a systemic problem for DoD products today, but might pose future concerns. Major firms which build defense weapon systems have acquired the capabilities to produce primary subsystems and components that go into those platforms. Firms can use these internal "vertical" capabilities to their advantage – without consideration for, or despite the superiority of, the capabilities of outside sources. DoD has been working effectively with the antitrust enforcement agencies to identify and address vertical integration concerns during reviews of proposed industry mergers and acquisitions. However, the Department has not been as well postured in its ongoing program management activities.

The Department, therefore, is revising DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs," to ensure that defense industry vertical integration does not harm defense products. DoD 5000.2-R will specify that all acquisition programs must foster competition at subcontractor levels, as well as at the prime level, particularly in critical product and technology areas. Additionally, program managers will be required to focus on subtier competition during early exchanges of information with industry (for example, when discussing draft Requests for Proposal) and when managing the program.

DoD Assessments, Decisions, and Actions

In 1997, the Department and its Components conducted a series of assessments to identify and evaluate those industrial and technological capabilities needed to meet current and future defense requirements. It then used the results of these assessments to make informed budget, acquisition, and logistics decisions. In some cases, the assessments addressed areas of interest which cut across Service boundaries. These assessments were performed in a cooperative manner with the appropriate DoD Components and civil agencies.

Additionally, DoD Components (the Army, Navy, Air Force, Defense Logistics Agency, and Ballistic Missile Defense Organization) conducted their own analyses when: (1) there was an indication that industrial or technological capabilities associated with an industrial sector, subsector, or commodity important to a single DoD Component could be lost; or (2) it was necessary to provide industrial capabilities information to help make specific programmatic decisions.

These DoD and DoD Component assessments generally led to similar conclusions. Although the defense industry is experiencing significant reductions and downsizing, there were very few cases where essential capabilities were endangered, even given low production rates. In those few cases, the Department is taking steps to assure essential capabilities will continue to be available.

In response to Department concerns that vertical integration in the defense industry could have a potential effect on product competition and innovation, a Defense Science Board Task Force on Vertical Integration and Supplier Decisions reported that vertical integration did not appear to be a systemic problem for DoD products today, but might pose future concerns. The task force recommended a number of steps to address such concerns. DoD endorsed task force findings and began a series of policy and procedural changes to improve its ability, in its ongoing acquisition processes, to address problems that may emerge from increased vertical integration.

DoD also began to evaluate and address changes in key component and material providers which supply many programs, affecting competition and innovation, and product availability. The Department evaluated suppliers of microwave power tubes and carbonizable rayon fiber. Microwave power tubes generate and amplify microwave energy for DoD applications in radar systems, electronic warfare systems, and telecommunications systems and for Department of Energy applications in high energy physics, nuclear physics, and materials science research. The National Aeronautics and Space Administration and DoD use carbonizable rayon fiber-reinforced composites in solid rocket motor nozzles and in reentry vehicle heat shields. In each case, DoD and the appropriate agency established mechanisms to ensure that industry changes in response to reduced spending would not impact DoD's ability to meet future mission requirements.

In response to Congressional inquiries, the Department performed broad assessments related to foreign supplier participation in DoD aircraft landing gear and instrumentation recorder acquisitions. After examining landing gear acquisitions between 1992 and 1996, the Department concluded there was no indication that U.S. landing gear companies are facing major foreign, government-subsidized competition. DoD reviewed current and planned information systems incorporating instrumentation recorders to determine if the use of foreign instrumentation recorders compromised national security. (Instrumentation recorders receive, save, reproduce, or replay data for test aircraft, spacecraft, satellite, surface ship, submarine, and communications applications.) Although foreign instrumentation recorders are used in classified applications, DoD Components have procedures in place to guarantee the security of the defense system. DoD concluded that its use of foreign recorders does not compromise national security.

Generally, DoD Component intervention actions have been limited to preserving selected capabilities for which DoD peacetime requirements are limited, and projected military contingency requirements are significantly larger. In such cases, DoD Components have restricted competition in a solicitation, for mobilization base reasons, to domestic sources and/or acquired and maintained facilities, equipment, or materiel needed to meet projected military contingency (surge and replenishment) requirements.

1. Annual Report Requirements

Section 2504 of title 10 of the United States Code requires the Secretary of Defense to submit an annual report to the Committee on Armed Services of the Senate and the Committee on National Security of the House of Representatives, by March 1st of each year. The report is to include descriptions of:

- Department of Defense (DoD) industrial and technological guidance issued to facilitate the attainment of national security objectives, including that guidance providing for the integration of industrial and technological capabilities considerations into its budget allocation, weapons acquisition, and logistics support decision processes.

- Methods and analyses undertaken by the DoD, or in cooperation with other Federal agencies, to identify and address industrial and technological capabilities concerns.

- Selected industrial and technological capabilities assessments prepared pursuant to Section 2505 of title 10 of the United States Code, and other analyses used in developing the DoD's budget submission for the next fiscal year, including a determination as to whether identified instances of foreign dependency adversely impact warfighting superiority.

- DoD programs and actions designed to sustain specific essential technological and industrial capabilities.

This report responds to this requirement.

2. DoD Policy Guidance

The end of the Cold War has brought dramatic changes to DoD's relationship with the national and world economies. With significant changes in military missions and sharp reductions in defense spending, the Department of Defense must rely on the broader commercial world, and a reshaped defense industry, to equip its forces.

When developing new defense systems, DoD prefers commercial options. The Department will develop military-unique capabilities or components only after it has determined that commercial technologies and products will not meet its requirements. Accordingly, the Department is continuing its efforts to break down the barriers between the commercial and defense industries in order to realize the benefits of civil-military integration in both research and development and manufacturing, increase the pace of innovation in defense systems, and reduce the cost of such systems. The Department is developing a strategic plan, expected to be completed in early 1998, to achieve greater civil-military integration.

Responding to the declining defense budget, defense firms reduced excess capacity, streamlined processes, and revamped supplier relationships. These actions have led to increased efficiencies, reduced defense product costs, and better value for taxpayers. However, these changes also could have important consequences for the Department's ability to meet its future mission requirements. In 1995 and 1996, the Department formalized policies and procedures necessary to make appropriate judgments about industrial issues and to integrate those judgments into its regular budget, acquisition, and logistics processes. These policies and procedures were summarized in the Department's February 1997 *Annual Industrial Capabilities Report to Congress*.

In 1996, the Department became concerned that one consequence of industry consolidation had been an increase in vertical integration and asked the Defense Science Board to establish a Task Force on Vertical Integration and Supplier Decisions. In 1997, the task force reported that vertical integration did not appear to be a systemic problem for DoD products today, but might pose future concerns. Major firms which build defense weapon systems have acquired the capabilities to produce primary subsystems and components that go into those platforms. Firms can use these internal "vertical" capabilities to their advantage – without consideration for, or despite the superiority of, the capabilities of outside sources. DoD has been working effectively with the antitrust enforcement agencies to identify and address vertical integration concerns during reviews of proposed industry mergers and acquisitions. However, the Department has not been as well postured in its ongoing program management activities.

The Department, therefore, is revising DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs," to ensure that defense industry vertical integration does not harm defense products. Section 3.3.2.4 of DoD 5000.2-R will specify that all acquisition programs must foster competition at subcontractor levels, as well as at the prime level, particularly in critical product and technology areas. Specifically, the acquisition strategy must:

- Identify the potential industry sources available to supply products and technologies critical to meeting the program's needs.

- Highlight areas where potential prime contractors also are potential suppliers of these critical products and technologies.

- Describe the approaches to be used to establish or maintain access to competitive suppliers for critical areas at the system, subsystem, and component levels.

Additionally, program managers will be required to focus on subtier competition during early exchanges of information with industry (for example, when discussing draft Requests for Proposal) and when managing the program. They must:

- Identify those critical product and technology areas that the potential prime contractors plan to provide internally or through exclusive teaming.

- Assess possible competition effects of these choices and take action to mitigate areas of risk.

- As the design evolves, identify and address areas where the design unnecessarily restricts subsystem or component choices.

- Challenge contractors during requirements and design reviews (throughout the entire weapon system life cycle) to explain why planned materiel solutions for subsystem and component requirements critical to the program are appropriate, given other available choices.

3. DoD Assessments, Decisions, and Actions

3.1 Introduction

The Department periodically conducts assessments to identify and evaluate those industrial and technological capabilities needed to meet current and future defense requirements. It then uses the results of these assessments to make informed budget, acquisition, and logistics decisions. In some cases, the assessments address areas of interest which cut across Service boundaries. These assessments are performed in a cooperative manner with the appropriate DoD Components and civil agencies. Summaries of DoD assessments completed in 1997 follow.

3.2 DoD Assessments

Report to Congress on U.S. Landing Gear Manufacturers (March 1997)

The Conference Report (H.R. Rpt. 104-863) for the Defense Appropriations Act, 1997, requested the DoD: (1) summarize its landing gear and landing gear component production and assembly acquisitions for fiscal years 1992-1996, and (2) describe, for landing gear and components produced or assembled by foreign sources, any foreign government programs which provide assistance in that country for the design, development, production, and assembly of landing gear and landing gear components. DOD reported:

- Sixteen U.S. or foreign landing gear manufacturers provided landing gear or major landing gear components to the DoD and its prime aircraft contractors during 1992-1996.

- During this period, 76 percent of landing gear and component sales for U.S. military aircraft were supplied by U.S. firms and 10 percent were supplied by Canadian firms. (Although Canadian firms were listed as "foreign landing gear manufacturers" for the purposes of the report, 10 U.S.C. 2491 defines the "national technology and industrial base" as the U.S. and Canada.)

- Firms located in the United Kingdom, Israel, Switzerland, and Germany provided the balance of the landing gear and components.

- None of the foreign governments provide assistance to their firms for the design, development, and production of landing gear or landing gear components.

- There is no indication that U.S. landing gear companies are facing major foreign, government-subsidized, competition.

Industrial Assessment of the Microwave Power Tube Industry (April 1997)

Microwave power tubes are used to generate and amplify microwave energy – a form of electromagnetic radiation – for a variety of applications. DoD uses microwave power tubes such as klystrons, traveling wave tubes, and crossed field amplifiers in land, sea, air, and space applications; in radar systems, in electronic warfare systems, and in telecommunications systems. The Department of Energy (DOE) uses large, high-power klystrons to power particle accelerators used for high energy physics, nuclear physics, and materials science research. Additionally, DOE is considering developing a new capability for nuclear weapons material production, for which it also would use large, high-power klystrons. The microwave power tube industry is one of many defense-related industries that have been affected by significant reductions in defense spending. The DoD formed an Integrated Product Team, with DOE participation, to analyze the effects of declining expenditures for microwave power tubes on its programs. The assessment concluded:

- DoD and DOE microwave power tube applications employ complementary industrial capabilities. The same manufacturers provide microwave power tubes to DoD, civil government agencies, and commercial customers. Although differing applications require different products, klystrons used for either DoD or DOE applications employ industrial capabilities common to the industry for design, development, and production.

- Microwave power tube sales have declined, primarily due to reductions in defense spending. Between 1985 and 1995, U.S. manufacturer microwave power tube sales declined 62 percent – from $671 million to $256 million. During the same period, DoD purchases declined 68 percent (from $570 million to $180 million) and U.S. manufacturer non-DoD sales declined 25 percent (from $101 million to $76 million).

- DoD research and development spending also has declined, but planned DoD technology funding levels are sufficient to maintain essential industrial and technological capabilities and meet new DoD product technology requirements.

- DOE activities contribute to, but will not change fundamentally, the long-term sales picture.

- The U.S. microwave power tube industry has restructured. Some U.S. manufacturers have gone out of business; some have been absorbed by other manufacturers. Although publicly-available financial information on U.S. microwave power tube manufacturers is limited, all companies surveyed indicated they currently are profitable, increasing manufacturing efficiencies, eliminating excess capacity, and targeting non-military applications.

- Industry trends have not adversely impacted the U.S. microwave power tube industry such that direct DoD intervention is required to maintain national security. Current microwave power tube industrial capabilities are adequate to meet DoD requirements.

- Because of the diverse manner in which individual microwave power tubes are procured and uncertainties in future DoD system requirements, it is difficult to precisely project the types and quantities of microwave power tubes DoD will require in future years. Changed requirements for microwave power tube types or quantities could have a significant impact on individual manufacturers.

Since changing circumstances could endanger essential engineering and product development capabilities, DoD determined it must better monitor the U.S. microwave power tube industry and coordinate its microwave power tube activities. DoD designated the Navy as its executive agent to:

- Identify and maintain consolidated DoD microwave power tube acquisition requirements and research and development plans.

- Monitor the major domestic microwave power tube manufacturers and key component and material suppliers.

- Facilitate coordination among the Services and Defense Agencies, and among DoD and other U.S. Government Agencies which use microwave power tubes.

The executive agent reports to the Under Secretary of Defense for Acquisition and Technology.

Defense Science Board Task Force on Vertical Integration and Supplier Decisions (May 1997)

One consequence of the industrial consolidation within the U.S. may be an increase in vertical integration in defense firms. Vertically integrated defense firms are those which have the capability to internally (within the firm) design and produce some of the subsystems or components used in the products they sell. The Under Secretary of Defense for Acquisition and Technology chartered a Task Force on Vertical Integration and Supplier Decisions to examine the effects of defense industry vertical integration and supplier decisions and recommend what, if any, revisions to DoD policy, practice, or investment strategies are required to deal with these issues. The task force concluded:

- Consolidation has increased vertical capabilities in some defense firms. However, vertical integration does not appear to be a primary goal of the consolidation. Rather, it is a collateral effect of firms' goals to buy good businesses with backlog orders and to increase diversification for future sales.

- Vertical Integration does not appear to be a systemic problem today, but warrants caution. The task force found little evidence that firms are using their increased vertical integration to harm defense products or other firms today, but a potentially static defense

business climate may encourage firms to use internal "vertical" capabilities to their advantage – and to other firms' disadvantage in the process.

- The DoD's process to review proposed industry mergers and acquisitions is working well. However, DoD is not as well postured in its ongoing acquisition program management to recognize when vertical integration might create a potential problem.

The Under Secretary of Defense for Acquisition and Technology accepted task force conclusions and recommendations and directed several steps be taken to improve DoD acquisition program management:

- Increase DoD visibility by monitoring selected, important subtier supplier product and technology areas. This includes corporate monitoring of key product and technology areas on an ongoing basis and increased scrutiny by individual acquisition program managers of prime contractor supplier decisions.

- Foster competition at prime contractor and subtier supplier levels. In devising its acquisition program strategies, the Department will facilitate vigorous "best value" competition at the prime level to stimulate competition at the subtier level. DoD will consider alternatives such as using open systems architectures, promoting leader/follower productions, funding a program risk reduction period to encourage more entrants, and elevating critical subtier product areas in source selection reviews.

- Examine how science and technology investments can shape and enhance future competitions.

- Improve the knowledge of Department managers about industry, so they can be smart, effective, arms-length buyers. DoD will expand the curricula at defense schools and improve the credentials of DoD's acquisition managers to emphasize industrial and business knowledge and analysis techniques.

Assessment of Aerospace Grade Rayon Supply Sources (May 1997)

In May 1996, North American Rayon Corporation, the sole aerospace grade rayon supplier, advised the U.S. Government and its other customers that it would discontinue rayon production upon completing current orders in late 1996. NASA's Space Shuttle program and most DoD programs using solid rocket motors incorporate carbonized rayon fiber-reinforced composites in the motor nozzles. This material also is used for DoD reentry vehicle heat shields. DoD and NASA chartered a team to determine what course of action should be taken. The team determined:

- The rayon fiber used in these applications must meet a series of demanding specifications. To ensure safety and reliability, a supplier change would require complete

requalification of the rayon fiber and of each rocket motor application. This could be very expensive.

- Potential solutions include developing alternative materials, reducing stringent program qualification requirements to reduce requalification costs, and long-term rayon storage.

- The most cost-effective solution would be to procure sufficient rayon fiber to meet projected "lifetime" requirements for DoD and NASA programs.

DoD purchased sufficient material to meet all of its requirements until 2002 and for lifetime buys for most programs. NASA procured sufficient material to meet its needs through 2005. Program offices will evaluate, develop as necessary, and utilize alternative sources or materials to meet future program needs.

Foreign Instrumentation Recorders in Critical Defense Systems (December 1997)

Instrumentation recorders are special-purpose storage devices that receive analog signals or digital data from sensors, receivers, and related information-collection products, save the data on magnetic tape or other storage media, and reproduce or replay the data for subsequent processing, analysis, and dissemination. DoD uses instrumentation recorders in test aircraft, spacecraft, satellite, surface ship, submarine, and communications applications. DoD reviewed current and planned information systems incorporating instrumentation recorders to determine if the use of foreign instrumentation recorders compromised national security. The assessment concluded:

- With sharp reductions in defense spending, the Department wants to take full advantage of the benefits offered by access to the best global suppliers. It also wants to promote consistency and fairness in dealing with its allies, while assuring that an adequate industrial base is maintained to support defense needs. In addition, while the DoD may purchase from reliable foreign suppliers, it will not accept foreign vulnerability which could present a risk to U.S. national security.

- DoD Components have competitively purchased both domestic and foreign instrumentation recorders.

- Foreign instrumentation recorders sometimes are used in classified applications. However, for classified applications, the DoD Components have procedures in place to protect the integrity of the recorded data and guarantee the security of the defense system, regardless of the source of the instrumentation recorder.

- DoD found no indications that its use of foreign recorders compromises national security.

4. DoD Component Analyses, Decisions, and Actions

4.1 Introduction

DoD Components frequently conduct their own analyses when: (1) there is an indication that industrial or technological capabilities associated with an industrial sector, subsector, or commodity important to a single DoD Component could be lost; or (2) it is necessary to provide industrial capabilities information to help make specific programmatic decisions. These assessments generally are conducted, reviewed, and acted upon internally within the DoD Components. Summaries of DoD Component analyses completed in 1997 follow.

4.2 Army

Acquisition of Load, Assemble and Pack of the M795, 155mm High Explosive Projectile (March 1997)

This assessment was designed to determine if the Army should use other than full and open competition to award a contract for load, assemble, and pack (LAP) of the M795, 155mm high explosive (HE) projectile. The Army has a funded 1997 LAP requirement for 84,000 M795 projectiles. The Iowa Army Ammunition Plant (IAAP), operated by Mason & Hanger Corp., has produced the M795 in the recent past. The assessment concluded:

- Large projectile LAP requires, and IAAP possesses, unique equipment to preheat the projectiles, control explosive melting/mixing, automatically pour the explosive, control explosive cooling, and x-ray inspect the loaded projectile. The IAAP also has the mission to replenish several large caliber ammunition rounds, including the M795, expended in a major theater war. Production rates required to meet replenishment requirements greatly exceed peacetime procurement production rates.

- The Army wants to gain the benefits of competition; it does not want to award a sole source contract to Mason & Hanger (operating IAAP), despite its unique capabilities. However, contract award to a supplier not located in the U.S. or Canada represents an unacceptable national security risk. (The U.S. and Canada have entered into a memorandum of understanding in which the Canadian government has agreed to persuade Canadian firms to voluntarily comply with U.S. government requests for such assistance as that statutorily required of U.S. firms under the provisions of the Defense Priorities and Allocations System (DPAS). Under DPAS, U.S. firms can be compelled to meet military requirements by (1) performing specific defense contracts on a priority basis over other defense or non-defense contracts, and (2) rapidly increasing production to maximum capacity.)

The Army decided to restrict this contract to domestic (U.S./Canadian) sources for mobilization base reasons, as permitted in FAR 6.302-3.

Acquisition of M795, 155mm HE Projectile Metal Parts (March 1997)

This assessment was designed to determine if the Army should use other than full and open competition to award a contract for M795, 155mm high explosive (HE) projectile metal parts. The Army has a funded 1997 requirement for 85,680 sets of metal parts to support the production of 84,000 M795 projectiles. Chamberlain Manufacturing Corp. operates the inactive Scranton Army Ammunition Plant (AAP). It has produced the M795 metal parts in the recent past. The assessment concluded:

- Large projectile metal parts production requires, and Scranton AAP possesses, unique equipment to (1) hot forge large caliber shells, (2) heat treat projectiles in an inverted position, (3) weld the copper band on the high fragmentation body, and (4) perform ultrasonic inspection. Scranton AAP also has the mission to replenish metal parts for many large caliber munitions expended in a major theater war (including 105mm and 155mm artillery projectiles, 120mm tank high explosive projectiles, and Navy 5-inch projectiles). Production rates required to meet replenishment requirements greatly exceed peacetime procurement production rates.

- The Army wants to gain the benefits of competition; it does not want to award a sole source contract to Chamberlain Manufacturing, despite its unique capabilities. However, contract award to a supplier not located in the U.S. or Canada represents an unacceptable national security risk. (The U.S. and Canada have entered into a memorandum of understanding in which the Canadian government has agreed to persuade Canadian firms to voluntarily comply with U.S. government requests for such assistance as that statutorily required of U.S. firms under the provisions of the Defense Priorities and Allocations System (DPAS). Under DPAS, U.S. firms can be compelled to meet military requirements by (1) performing specific defense contracts on a priority basis over other defense or non-defense contracts, and (2) rapidly increasing production to maximum capacity.)

The Army decided to restrict this contract to domestic (U.S./Canadian) sources for mobilization base reasons, as permitted in FAR 6.302-3.

Beryllium-Aluminum Casting Capacity (May 1997)

Nuclear Metals Inc. (NMI) has made depleted uranium penetrators for tank ammunition for a number of years. In recent years, NMI has used internal funds and research and development funding from the Army aviation community to develop a family of castable beryllium-aluminum (Be-Al) alloys. Be-Al alloys are highly rigid, yet very lightweight; and casting the material allows parts with complex shapes to be produced economically. NMI asserted its Be-Al production facility had insufficient capacity to meet RAH-66 Comanche helicopter production requirements, when combined with anticipated other DoD and non-DoD

demand. NMI requested the Army provide it production base support funding to expand its Be-Al production capacity. The Army performed an assessment to determine if it would be cost- and mission-effective to provide the requested funding. The assessment concluded:

- NMI's current facility is neither designed nor equipped for substantial production. It is an evolutionary expansion of the firm's original research and development facility.

- NMI expansion plans are ambitious. They include increasing the number of furnaces from one to three, acquiring ancillary production and testing equipment, and arranging all equipment in an assembly line configuration.

- Despite facility limitations, NMI already has significant Be-Al production capacity. By 2004, Comanche program requirements likely will utilize only 62 percent of NMI's Be-Al casting capacity. When potential requirements for the Patriot Advanced Capability Missile and Advanced Threat Infrared Counter Measures programs are considered, NMI still has sufficient capability to meet requirements for the foreseeable future.

- Brush-Wellman, represents a potential alternative source, although its technology lags that of NMI.

The Army decided not to fund NMI Be-Al facility expansion. It identified no substantive risk to the Comanche program. Difficulties that might arise from increased demand from other DoD programs will be addressed by those programs, if necessary, and production capacity required to meet non-DoD demand is the responsibility of NMI. However, there are potential risks associated with transitioning from the research and development orientation of NMI's production facility to one of full rate production. Army representatives will monitor this situation as the Comanche program matures and production quantities increase.

Recommended Strategy for Configuring and Managing the U.S. Munitions Industrial Base (June 1997)

Major changes in the national military strategy, coupled with pressure to reduce the federal budget, have led senior DoD officials to reassess how the ammunition industrial base is managed. The Army commissioned Battelle Corporation Pacific Northwest National Laboratory (PNNL) to perform an independent, comprehensive assessment of the contractor-owned and government-owned ammunition industrial base. The PNNL report concluded:

- The process for determining ammunition replenishment requirements is imprecise; therefore requirements are somewhat uncertain.

- Generally, the production base has the capacity and capabilities to meet peacetime and replenishment needs, but it is not efficient.

- The ammunition industrial base contains unique skills and production assets that need to be actively managed to assure continued availability.

- The management system is fragmented. Responsibilities and accountabilities are divided among several major organizational elements. For example:

  ◊ The Army Research and Development Command is responsible for research and development.

  ◊ Program Managers are responsible for new item development and initial production.

  ◊ The Army Industrial Operations Command is responsible for the production of transitioned items, stockpile maintenance, demilitarization, and industrial base planning.

- The business environment is not stable. Because funds for ammunition procurements are appropriated annually, procurements have fluctuated wildly from year to year.

- DoD should:

  ◊ Manage munitions as a major program, using the DoD life-cycle acquisition process.

  ◊ Eliminate management system fragmentation by consolidating management responsibility and financial resources for ammunition in a Program Executive Office (PEO) for Ammunition. The PEO for Ammunition would develop ammunition budgets and allocate authorized funds. The PEO would have the tools necessary to implement a unified life-cycle management approach across all conventional ammunition items.

  ◊ Acquire ammunition from the commercial sector. Transition government-owned production assets to the private sector while preserving the ability to conduct explosives handling operations safely. The private sector would create and sustain production assets in response to production and replenishment contracts.

  ◊ Apply acquisition reform initiatives already under way in DoD to the ammunition acquisition process to stabilize the business environment and incentivize industry investment in the production base. The Department should focus its activities on accurately expressing the total need for munitions and let industry, operating in a competitive marketplace, determine how best to meet the needs.

The Army is evaluating these recommendations and has formed two integrated process teams to make specific implementation proposals. The first team is examining the ammunition management organization and will suggest several alternative structures. Army leaders will consider the alternatives and decide on the course of action which will improve ammunition

management most cost-effectively. The second team is developing a business case for each facility and will determine how best to apply commercialization tenets to improve efficiency and reduce costs. This team also will select prototype facilities with which to begin.

Microwave Modules: An Assessment of U.S. Capabilities (July 1997)

Microwave modules are used to transmit and receive microwave signals for a variety of military and commercial applications. A 1995 survey of the six major microwave module manufacturers indicated that these manufacturers had a capacity of about 170,000 modules per year. The Army surveyed microwave module design, development, and production capabilities, including subcomponent suppliers, to determine if current and projected capabilities were sufficient to meet DoD requirements. The assessment concluded:

- Microwave module manufacturers have increased production capacity by nearly 300 percent since 1995. Module manufacturers expect to increase their capacity by another 35 percent by the year 2000.

- Commercial demand, primarily from the automotive and communications industries, is expected to rapidly outpace military demand over the next few years. By 2010, automotive applications for microwave modules are expected to require five million systems per year.

- DoD demand is expected to increase to about 300,000 modules within the next five years and to somewhat less than 500,000 units by 2010. Several major DoD programs (F-22, Theater High Altitude Area Defense, and National Missile Defense - Ground-Based Radar) which use microwave modules extensively are nearing production.

- Microwave module production capacity should be sufficient to meet both commercial and defense demand through 2001. Planned expansion, based on projected increased commercial demand, if implemented, should be sufficient for meeting all known DoD requirements through 2010.

The commercial market is expected to drive microwave module process and design improvements in the relatively near future. DoD weapon system managers will monitor commercial application improvements and "spin-on" those technologies that will enhance system performance while reducing cost.

Depleted Uranium Industrial Base Assessment (September 1997)

DoD uses depleted uranium (DU) penetrators in the 120mm kinetic energy (KE) M829A2 tank round and in the 25mm M919 Bradley round, and expects to use them in the next generation 120mm KE M829E3 tank round. Budget projections suggest there will be a DU penetrator production gap between the time the last M829A2 is scheduled to be produced in April 1999 and

the beginning of M829E3 penetrator production, scheduled for February 2003. House of Representatives Committee on Appropriations Report 104-617, dated June 11, 1996, expressed concern that a break in production of 120mm KE tank ammunition could result in a loss of the industrial capabilities required to produce this class of ammunition, when required. The Committee directed the Army to prepare a plan that bridged the production gap. The Army reviewed current DU production capabilities, identified current and projected DU procurement requirements, and identified and evaluated options to ensure sufficient industrial capabilities are available to meet current and projected requirements as cost-effectively as possible. The assessment concluded:

- Nuclear Metals Inc. (NMI) and Aerojet Ordnance of Tennessee (AOT) are the sole producers of DU penetrators. NMI also produces DU billets used in tank armor production. Oak Ridge National Laboratory is capable of producing DU penetrators, provided it supplements its current equipment with government-owned equipment now located at NMI and/or AOT.

- DoD's Authorized Acquisition Objective for KE tank rounds is filled with a combination of M829A1 and M829A2 rounds. The A1 (substitute) round is not as effective as the A2 (preferred) round. The Army expects to begin replacing both rounds in 2003 with the M829E3.

- A single DU penetrator producer would provide sufficient industrial capabilities (including capacity) to meet all current and projected military requirements. With the possible exception of the sabot, other key 120mm KE tank round industrial capabilities will be sustained during a production break. The Army has not yet determined what impact a production break would have on the sole source sabot supplier.

To bridge the production gap and preserve essential DU penetrator industrial capabilities, the Army is considering funding M829A2 production from 1999 through 2002 at a minimum sustaining level. DoD is conducting additional analyses and expects to make a final decision on actions to sustain essential industrial capabilities prior to release of the fiscal year 2000 President's Budget.

Joint Service General Purpose Mask Industrial Base Assessment (September 1997)

Between 1999 and 2003, the Army plans to develop a new chemical protective mask, the Joint Service General Purpose Mask (JSGPM). DoD expects to purchase between 2 million and 2.5 million masks over a ten-year production period, beginning in 2004. The Army conducted an assessment to determine if there will be sufficient technological and industrial capabilities available to meet planned DoD JSGPM development and production requirements. The assessment concluded:

- Both ILC Dover and Mine Safety Appliances, the current prime contractor and the previous producer of the M40/42 Chemical Protective Mask, are experienced in military mask development and production. Both plan to compete for the JSGPM program.

- Campbell Plastics, a small business, has a current contract through which it is developing the capabilities necessary to develop and produce military protective masks.

- American Technology Corp., another small business, has experience in designing and producing parts for past military mask programs.

- National Draeger, Racal Inc., and Scott Aviation have experience developing and producing commercial respiratory protection equipment; and also have limited experience with military masks.

The Army determined it need take no special action to ensure there will be sufficient technological and industrial capabilities available to meet JSGPM requirements. Several companies have the necessary capabilities.

Technology Capability Assessment of Next Generation Contamination Avoidance Systems (September 1997)

Chemical and biological defense system technologies are designed to protect personnel operating on the ground, at sea, or in the air. Contamination avoidance systems must provide a real-time capability to detect, identify, locate, quantify, warn, and report chemical and biological threats. The U.S. Army Chemical and Biological Defense Command, with support from the U.S. Army Industrial Engineering Activity, evaluated the extent to which key technologies are, or will be, available for nine next generation contamination avoidance system programs. The nine programs are in acquisition Phase O (Concept Exploration and Definition), Phase I (Demonstration and Validation), or Phase II (Engineering and Manufacturing Development). The Army evaluated the:

- Chemical Biological Mass Spectrometer (CBMS), Block II - will detect and classify chemical and biological agents.

- Joint Biological Point Detection System (JBPDS), Block II - an air sampling and analysis device providing visual and audible alarms in the presence of biological agents. It will be integrated into all Service applications (trucks, ships, etc.) and will provide a common detection capability facilitating joint operations and support.

- Joint Biological Remote Early Warning System (JBREWS) - will detect and track, remote from troop concentrations, large area biological warfare aerosol clouds.

- Joint Chemical Agent Detector (JCAD) - will be placed in aircraft, interior of ships, or into the pocket of service members.

- Joint Service Agent Water Monitor (JSAWM) - a sampling and analysis device that will provide visual and audible alarms in the presence of chemical and biological agents.

- Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) - will provide standoff coverage for a distance of up to five kilometers, on the move, over 360 degrees; from rotary and fixed wing aircraft, tracked and wheeled vehicles, ships, and fixed emplacements.

- Joint Lightweight Nuclear Biological Chemical Agent Reconnaissance System (JLNBCRS) - will be mounted on a wheeled vehicle and will detect and identify contaminants while on the move.

- Joint Warning and Reporting System (JWARN), Block I - a network; it will detect contaminants, process information, warn personnel, and print reports.

- Multipurpose Integrated Chemical Agent Alarm (MICAD) - will integrate detection, warning, and reporting systems. It will automate nuclear, biological, and chemical battlefield reporting.

Analysis results follow:

Program	**Assigned Risk Rating**	**Key Technology to be Employed**
CBMS (Block II)	Moderate	Ion Trap Mass Spectrometer; Quadpolar Ion Storage
JBPDS (Block II)	Low	Commercial-off-the-Shelf; DoD Developmental Programs; Spectroscopy
JBREWS	Low	Ultraviolet Laser Particle Sizing; Immunoassay Fiber Optic Wave Guide
JCAD	Low	None specified
JSAWM	None Assigned	Surface Enhanced Raman Spectroscopy
JSLSCAD	Low	Passive Infrared; High Speed Electronics; Advanced Algorithm Filtering; Advanced Scanning
JLNBCRS	Moderate	None Specified
JWARN (Block I)	Low	Commercial-off-the-Shelf Software; DoD-developed Software
MICAD	Low	Sample Transfer System; Digital Battlefield Communication

- The CBMS (Block II) was assigned a "moderate" risk rating due to anticipated difficulties in identifying bio-markers for threat bacteria and in evaluating mass spectra while minimizing background interference.

- The JLNBCRS was assigned a "moderate" risk rating because it will utilize CBMS, JBPDS, JSLSCAD, a chemical agent monitor, and an automatic chemical agent detector system, all in an integrated system.

- The JSAWM was not rated; it is too early in the development cycle (Phase O).

- All other programs were assigned "low" risk ratings. These programs will use commercial-off-the-shelf or DoD-developed technologies, techniques, or equipment; or technologies which exist in the laboratory. Integrating the components in these programs should not be difficult.

Some key technologies require further development; however, several DoD, industry, and university laboratories are engaged in relevant research. DoD personnel will monitor progress as work continues.

Justification and Approval for Other Than Full and Open Competition for Military Track for Combat Vehicles (September 1997)

The Army, National Guard, and Marine Corps procure combat vehicle track to support both combat vehicle production and spare parts replenishment. The Army is the procuring agency. This assessment was designed to determine if the Army should: (1) award Goodyear Tire and Rubber Company a non-competitive contract for various military track systems and replaceable track shoe assemblies, and (2) competitively award up to two additional contracts for those track requirements not needed to cost-effectively sustain Goodyear's production processes. The assessment concluded:

- Goodyear is the only source qualified to meet all DoD track (including in-house research and development) requirements. Reductions in the number of tracked combat vehicles, along with significantly improved inventory management, have substantially reduced the Department's track requirements. Because of the magnitude of reductions, Goodyear has considered leaving the business.

- Production of approximately 264,000 units per year would cost-effectively sustain Goodyear's production processes.

- Significant war reserve inventory shortfalls require that the Army utilize a proven supplier which can rapidly increase production to meet increased operating tempo requirements in the event of a conflict. Goodyear has the capability to (1) ramp up "currently-in-production" track shoe production rates by a factor of 2-3, depending on the specific track product, within 15-30 days of notification; and (2) reach full-up production rates for all "out-of-production" track shoes within 120 days of notification.

- Under provisions of the Defense Priorities and Allocations System, U.S. firms can be compelled to meet military requirements by: (1) performing specific contracts on a priority basis over other defense or non-defense contracts, and (2) rapidly increasing production to maximum capacity. Firms located in other nations cannot be so compelled.

The Under Secretary of Defense (Acquisition and Technology) authorized the Army to use other than competitive procedures, for mobilization base reasons, for the acquisition of military track for combat vehicles. The first 264,000 units of track procured yearly for a period of three years will be awarded to Goodyear. Any yearly quantities over 264,000 will be awarded competitively.

Small Caliber Weapons Industrial Base Sector Study (September 1997)

Small caliber weapons include semi-automatic pistols, shotguns, carbines, rifles, grenade launchers, and machine guns of various types. These weapons are designed to be fired from the hand, hip, shoulder, or light mounts. As operational requirements have changed and force structures have been reduced, DoD small arms demand has diminished sharply. The Army is the only Service with significant current small caliber weapons procurement requirements. From 1997 through 2001, the Army plans to acquire MK19 grenade machine guns, M249 squad automatic weapons, M16-series rifles, M4-series carbines, and M240-series machine guns. Colt's Manufacturing, FN Manufacturing, Inc., and Saco Defense are the principal suppliers of these weapons. This study examined the extent to which required industrial and technological capabilities will be available to meet DoD's current and projected small caliber weapons requirements. The study concluded:

- DoD must be able to acquire critical spare parts quickly to support operations in high-intensity, short-term, major regional conflicts.

- Available production capacities significantly exceed those required to meet current and projected production, spare/repair part, and after-conflict replenishment production requirements.

- DoD can rely on commercial demand for hand guns and shotguns to sustain required industrial and technological capabilities for these weapons. DoD should encourage other small caliber weapons manufacturers to explore opportunities to increase their commercial business.

- After 2001, when DoD small caliber weapons procurement is expected to decline further, there likely will be insufficient DoD demand to sustain the three principal small caliber weapons suppliers.

- DoD requirements for spare/repair parts, fielded weapons overhaul, modest new weapons production, and planned improvements of current weapons likely will be sufficient to sustain required industrial and technological capabilities after 2001, even if the industry downsizes.

The Army need take no special actions to sustain essential industrial and technological capabilities. It will continue to monitor the industry to ensure it has access to the essential industrial and technological capabilities needed to meet its small caliber weapons requirements.

4.3 Navy

RAND National Defense Research Institute Aircraft Carrier Industrial Base Testimony (April 1997)

The Navy asked RAND's National Defense Research Institute to perform an independent, quantitative analysis of the aircraft carrier industrial base. The analysis focused on scheduling and production issues associated with the next nuclear-powered aircraft carrier – the CVN 77. It addressed schedule constraints imposed by force structure goals; and industrial base and cost implications associated with changes in projected schedules. The RAND report has not been finalized and formally provided to the Navy. However, on April 22, 1997, the principal RAND analyst, Mr. John Birkler, summarized RAND's preliminary findings during testimony to the Sea Power Subcommittee of the Senate Armed Services Committee. Mr. Birkler testified that:

- Beginning with a CVN 77 production start in 2002, the Navy will need to begin one additional aircraft carrier every four years thereafter to maintain a 12-ship carrier fleet.

- Regardless of when or whether CVN 77 is built, the industrial base will be adequate to support production of large, nuclear-powered aircraft carriers for the foreseeable future.

- In the event of a production gap, critical skills will not be lost to the extent that it will be impossible to reconstitute them.

- However, it will be more difficult and expensive, and will take longer, to build an aircraft carrier after an extended gap. If the CVN 77 start date is delayed for just one year, it could cost about $300 million more than forecasted.

- For earlier start dates, CVN 77 could potentially cost:

  ◊ About $260 million less if begun one year earlier.

  ◊ About $390 million less if begun two years earlier.

  ◊ Between $50 million - $80 million less if the contractor is permitted to purchase selected long lead items earlier.

The Navy substantially adjusted the CVN 77 funding profile in the fiscal year 1999 President's Budget request. The revised profile accelerates procurement of the CVN 77 one year (to 2001) and adds Advance Procurement funding in 1999 and 2000. This "CVN 77 Acceleration" approach, which shortens the production gap between CVN 76 and CVN 77, provides significant industrial benefits while balancing other shipbuilding priorities.

Technology and Industrial Base Assessment for 21st Century Surface Combatant Acquisition Milestone I (June 1997)

The Navy plans to contract for the development and production of the 21st Century Surface Combatant (SC-21). The Navy conducted a survey to determine the extent to which technological and industrial capabilities required for SC-21 development and production were, and would be, available. The survey included major shipboard system developers and integrators (Boeing, Lockheed Martin/Loral, Raytheon (formerly Hughes), and Northrop Grumman), major shipbuilders (Avondale Shipbuilding, Bath Iron Works, Electric Boat, Ingalls Shipbuilding, National Steel and Shipbuilding, and Newport News Shipbuilding), and a representative sample of critical component and equipment suppliers. The Navy concluded:

- Despite significant consolidation, there are, and will be, sufficient technological and industrial capabilities at all levels of the shipbuilding industry to meet SC-21 program requirements.

- Key suppliers increasingly are diversifying into non-defense markets. DoD should benefit from expanded sales, increased rate of technological evolution, and improved product affordability.

- Technologies and manufacturing processes required for several key components require further development. However, these components will be matured and available to support SC-21 production requirements.

The Navy will continue to monitor industrial and technological developments affecting the SC-21 program as the program completes development and proceeds to production.

Amphibious Assault Vehicle Aluminum Hull Capability Study (July 1997)

The Amphibious Assault Vehicle (AAV7A1) is the newest assault amphibian. AAV7 production began in 1984. The AAV7A1 family of vehicles include the AAV7A1 Personnel Carrier, the AAV7A1 Command Vehicle, and the AAV7A1 Recovery Vehicle. These vehicles provide armor protection, command and control, and repair capabilities while transporting troops and cargo from ship to shore. They can negotiate ten foot plunging surf, difficult beaches, and rough terrain. They have a top speed of seven knots in the water and 45 miles per hour on land. Prior to issuing a proposal for the AAV Reliability, Availability & Maintainability/Rebuild to Standard (RAM/RS) program, the Marine Corps program manager asked personnel from the U.S. Army Industrial Engineering Activity to identify sources capable of: (1) managing the entire AAV RAM/RS program, and (2) machining and welding stripped AAV aluminum alloy hulls as part of that program. The assessment concluded:

- Seven potential suppliers have, or can acquire, the required capabilities: Anniston Army Depot, AV Technologies, General Dynamics Land Systems, General Motors Canada

(Detroit Diesel), Red River Army Depot, United Defense Limited Partnership, and VSE Corporation.

- Five of the seven potential suppliers were evaluated to be "low" risk. Low risk suppliers appear financially viable, have all required capabilities, and present negligible risk to achieving AAV RAM/RS performance, cost, and schedule objectives.

- Two of the seven potential suppliers were evaluated to be "medium" risk. Medium risk suppliers appear to be financially viable, and currently have, or can acquire, all required capabilities. These suppliers, if selected for the contract, would require annual program management office monitoring.

  ◊ One of these potential suppliers does not have in-house machining capabilities. Additionally, its welders are experienced in welding high hardness armor steel, but would have to pass qualification tests before welding aluminum structures.

  ◊ The other potential supplier does not manufacture products, itself; it subcontracts all manufacturing.

The Marine program management office is using the assessment information as part of the AAV RAM/RS program source selection process. The contract is scheduled to be awarded in 1998.

Joint Stand-Off Weapon Industrial Base Assessment (September 1997)

The Joint Stand-Off Weapon (JSOW) is an air-to-surface precision guided tactical munition with stand-off and adverse weather capabilities. It employs an inertial navigation system coupled with a global positioning system to improve accuracy. Texas Instruments, which has been acquired by Raytheon, has been the prime contractor for the High-Speed Anti-Radiation Missile (HARM) and JSOW. HARM production is ending; production tooling is being disassembled and stored. JSOW low-rate initial production began in 1997. The Navy conducted an assessment to identify and evaluate critical manufacturing and component obsolescence issues which might adversely impact JSOW production. The assessment concluded:

- JSOW program plans forecast that, as production increases, JSOW will absorb an increasing portion of the facilities and skilled labor formerly used in HARM production.

- A new supplier must be found for a key integrated circuit used in the JSOW global positioning system. The original supplier has left the business and the dies have been destroyed.

Program office personnel are monitoring JSOW production to minimize any impact arising from the consolidation of Raytheon production operations. JSOW program office personnel have identified two potential alternate suppliers for the precision global positioning

system integrated circuit. Navy personnel are working with the prime contractor to develop a new source and to eliminate or minimize attendant production delays.

H-53 Super Stallion Helicopter Industrial Base Assessment (September 1997)

The Navy plans to purchase one H-53 in 1998. The Navy conducted this assessment to identify and evaluate critical manufacturing and component obsolescence issues which might adversely impact H-53 readiness and production. The assessment concluded:

- Titanium casings and high temperature cobalt and nickel alloys used for compressor stages and high pressure turbine blades and vanes are subject to lengthening lead times (60-63 weeks for castings and 40-43 weeks for forgings). Program plans must reflect lead time increases to avoid production schedule slippage.

- Aging designs and reduced production requirements are encouraging suppliers to discontinue production of key electronic components. For example, the Electronic Engine Control Unit and the Digital Electronic Control Unit for the H-53 engine utilize obsolete discrete electronic components. Suppliers are discontinuing production of these discrete electronic components to concentrate on integrated circuits with wider market potential.

- Increased foreign sales could offset the impact of reduced DoD procurements, allowing the helicopter prime contractor, suppliers, and vendors to fill production lines and contain H-53 costs.

Navy and contractor personnel are monitoring materiel lead times to mitigate impacts on H-53 production. Navy and contractor personnel also are examining options to: (1) identify new suppliers for obsolete discrete electronic components, or (2) emulate the obsolete components with contemporary integrated circuits. Finally, Navy personnel, consistent with DoD policy, are encouraging friendly militaries to replace older H-53 helicopters with new ones.

F/A-18E/F Industrial Base Assessment (September 1997)

The F/A-18E/F is in low-rate production. The Navy conducted an assessment to identify and evaluate concerns associated with critical F/A-18E/F components that could impact full-scale aircraft production. The assessment concluded that the continued availability of flat panel displays posed a potential problem.

- Optical Imaging Systems (OIS) is the sole domestic supplier of military-qualified liquid crystal (flat panel) displays. These displays are used in the F/A-18E/F, F-22, and Joint Strike Fighter.

- To meet projected DoD flat panel display requirements, OIS invested $70 million to build a new 61,000 square foot facility. The projected demand has not materialized and the facility is now operating at less than 20 percent of capacity.

- Reduced facility capacity utilization leads to increased costs for each flat panel display, and increased flat panel display prices for DoD.

- OIS recently indicated that if orders for these state-of-the-art displays did not increase it would consider discontinuing production for military applications, and focus on medical and commercial display applications.

Navy personnel are monitoring OIS business and production issues. Navy personnel also are discussing with senior DoD and OIS managers the feasibility of using a "lease-to-buy" multi-year contract to stabilize military flat panel display production requirements and lower acquisition costs. The Navy also is establishing Planar Inc. as a second source to mitigate risks.

Taut Mask High Resolution Cathode Ray Tube Industrial Base Assessment (September 1997)

The cathode ray tubes (CRTs) used in fielded high performance aircraft utilize a reinforced (taut) mask behind the front glass of the tube. This taut mask is expensive to produce; manufacture requires specialized equipment and is labor intensive. Taut mask high resolution CRTs represent an older technology and gradually are being replaced by flat panel displays. Planar Inc. is the sole producer of taut mask high resolution CRTs. This Navy assessment evaluated concerns that low DoD requirements for such CRTs provide insufficient incentive for the sole source producer to continue production. The assessment concluded:

- DoD demand is limited to that quantity needed to replace CRTs in a variety of fielded military aircraft (for example, the AV-8B, F-14, F-15, F-16, B-52, B-1B, EA-6B, E-2C, P-3C.) The F/A-18E/F, F-22, and Joint Strike Fighter will utilize flat panel displays in lieu of CRTs.

- Planar has indicated it plans to leave the business if demand does not increase.

- Attempts to establish a second domestic source have not been successful.

Personnel at the Naval Inventory Control Point (NAVICP) in Philadelphia, working with Planar representatives, have determined that a production quantity of 25 units per month would provide sufficient incentive for Planar to continue as a source into the future. The NAVICP has ordered 132 units to meet fleet requirements and to prevent a near term production break. Since replacement rates for these CRTs are low, DoD personnel also are considering making a final, lifetime buy to meet all projected DoD requirements.

AIM-9X Industrial Base Assessment (September 1997)

The AIM-9X is one of DoD's primary air-to-air tactical missiles. This assessment identified and evaluated critical manufacturing issues which could impact missile production. The assessment concluded that there is a moderate risk associated with economical production of the new focal plane array seeker proposed for the AIM-9X; the contractor plans to produce the arrays using current equipment and facilities. However, several domestic and foreign contractors have expertise in this area. Additionally, several contractors are working independently to improve requisite manufacturing processes.

The Navy determined that no actions need be taken at this time

V-22 Osprey Industrial Base Assessment (September 1997)

This assessment identified and evaluated obsolescence issues associated with V-22 Osprey production and support. The assessment concluded that, because of the length of time required to field a new aircraft and the lengthening life expectancies of such aircraft, cost-effectively meeting supportability requirements represents a significant program management challenge.

To address this challenge, the Navy has entered into a performance-based contract with the V-22 prime contractor that assigns Bell-Boeing configuration management responsibility for V-22 digital flight controls, color weather radar avionics and electronics display and control systems and subsystems. Under the contract, Bell-Boeing will ensure these systems remain supportable. It will make form, fit, and function component replacements as necessary to employ contemporary electronic components and preclude component obsolescence. Navy personnel will maintain configuration management responsibility for those systems critical to aircraft flight safety and performance.

4.4 Air Force

Assessment of European Industrial Base (August 1997)

This assessment was conducted to: (1) address manufacturing technology developments, operating practices, process readiness capabilities, and potential for joint cooperative programs with companies in the United Kingdom (UK), (2) benchmark state-of-the-art processing and fabrication technologies applied to military products within the European community, and (3) use the knowledge gained on state-of-the-art European manufacturing processes and methodologies as an input to ongoing Air Force Manufacturing Science & Technology (MS&T) advanced industrial practices research.

The assessment team visited seven British manufacturers, a European industry association, and a UK Ministry of Defence research agency:

- GKN Westland Aerospace (aircraft structural components)
- Short Brothers PLC (aircraft structural components)
- European Gas Turbines Ltd. (engine rotating components)
- Rolls-Royce (military and commercial gas turbine engines)
- Messier-Dowty Ltd. (aircraft landing gear systems)
- Superform Aluminium (complex fabricated parts)
- Marshall Group of Companies (aircraft maintenance, repair, and overhaul)
- The Welding Institute (industry association)
- Defence Evaluation & Research Agency, Structural Materials Center (Ministry of Defence)

At each site, the team discussed and evaluated corporate background, product lines, manufacturing management and process technology areas of expertise, and topics for future discussion and/or collaboration. The assessment team concluded:

- All companies visited employ state-of-the-art material shaping, forming and machining processes.
- The larger companies (Rolls-Royce and GKN Westland) employ complex and effective design and manufacturing information management systems.
- Overall, the UK aerospace industry contains "World Class" systems level competitors, and suppliers, to U.S. firms.
- Continued dialogue on several specific technologies and processes offers opportunities to develop collaborative MS&T projects or establish mechanisms to share industrial practices and processes information beneficial to both UK and U.S. defense systems.

Air Force representatives are engaging UK industry and Ministry of Defence officials in discussions associated with: (1) in-process measurement techniques for gas turbine engine discs and blades, (2) factory control modeling, cost modeling, and virtual manufacturing (for tooling design and cycle time reduction), (3) high speed milling of aluminum, (4) friction stir welding, (5) three dimensional composite weaving, (6) manufacture of hollow silicon carbide fibers for improved compression strength, (7) laser perforation of laminates for press forming, and (8) bonding strength detection for aluminum and carbon skins to honeycomb cores.

Microwave Power Tubes (RF Vacuum Tubes) (December 1997)

Beginning in 1990, the Air Force's Electronic Systems Center (ESC) has pursued manufacturing process, reliability, producibility, and supportability improvements associated with microwave power tubes used in ground-based radars, the Airborne Warning and Control System (AWACS), and the Joint Surveillance and Target Attack Radar System. This assessment evaluated past improvement activities in order to identify mechanisms and opportunities to facilitate continued improvements.[1]

Because of limited payback potential, microwave power tube manufacturers have been reluctant to invest their own funds in manufacturing process improvements. Such improvements can improve performance and supportability, and reduce production costs.

- ESC previously took action to improve the supportability of the narrow-band klystron power amplifier used in the AWACS radar. Air Force-funded manufacturing process improvements led to increased production rates (from less than one, to five klystrons per month) and dramatic reductions in repair costs (from over $160,000 per power tube to about $88,000 per power tube).

- The Air Force sponsored a program to increase AWACS mission effectiveness and improve producibility by developing a wide-band gun and collector for four narrow-band klystron power tubes. Use of the wide-band gun and collector reduced the AWACS klystron failure rate by a range of 25-30 percent.

- The Air Force funded a producibility improvement program to demonstrate the feasibility of reworking the cathode surface of the gun during repair, resulting in significant reductions in power tube repair costs.

ESC concluded that: (1) additional Air Force-initiated process improvement efforts with industry can have substantial benefits, and (2) the Air Force should take further action to enhance the producibility and reliability of its microwave power tubes. ESC is examining potential product and process improvements for the traveling wave tube for the Perimeter Acquisition Radar Characterization System, and other radars.

Industrial Base Analysis of the Unmanned Aerial Vehicles Sector (December 1997)

The Defense Advanced Research Projects Agency originally structured and managed the Global Hawk and Dark Star Unmanned Aerial Vehicles (UAVs) as Advanced Concept Technology Demonstrations. Cost estimates for current UAV designs are increasing in response to increasing mission and performance requirements ("requirements creep"). The Department is

[1] See Section 3.2 of this report for DoD's overall *Industrial Assessment of the Microwave Power Tube Industry.*

considering transitioning one or both of these programs, or a hybrid, to a traditional Service acquisition program. This analysis baselined the industrial and technological capabilities required for the emerging UAV programs (both aerial vehicles and ground equipment) and for ongoing Air Force UAV programs. The analysis included an in-depth review of current prime contractors and supplier networks, and potential alternate sources for key subsystems and components. The Air Force identified potential problems, analyzed the impact of the emerging UAV programs, assessed program risk, identified opportunities for affordability improvements, and recommended corrective actions, as needed. The analysis focused on those areas in which a shift from technology demonstration to a production-type program, with attendant quantity increases, could yield cost savings. The analysis concluded:

- DoD demand for UAVs is projected to increase significantly over the next fifteen years. (Although used for decades as targets and for strategic reconnaissance, UAVs increasingly will be used for real-time tactical intelligence gathering, anti-aircraft defense suppression, electronic countermeasures, and other combat roles.)

- Unmanned and manned air vehicles employ similar technological and industrial capabilities. UAVs face no significant industrial capabilities limitations not already being experienced within the defense aerospace industry, in general.

- The aerospace industry is posturing itself cautiously for potential Service UAV acquisitions. It appears to be limiting capital investment in fixed assets; and focusing instead on maximizing existing technological capabilities (including core competencies created through recent mergers and acquisitions) and underutilized industrial capacity.

Air Force personnel are using analysis data to evaluate costs and manufacturing risks associated with purchasing additional Global Hawk and Dark Star air vehicles. Eventually, the Air Force will use the analysis to structure a comprehensive acquisition program, including: (1) inputs to the Future Years Defense Program, (2) acquisition strategies (competition, spares parts and logistics support decisions), and (3) interim investments in infrastructure.

4.5 DLA

Chemical Protective Gloves (April 1997)

Chemical protective gloves are an integral part of the chemical protective ensemble used to protect troops from chemical and biological weapons attack. The assessment was designed to determine if essential industrial capabilities would be lost in the absence of DoD peacetime procurements. (Annual Service protective glove procurements are insufficient to sustain the necessary production capabilities.) The assessment reevaluated issues previously addressed in April 1996. The assessment concluded:

- These gloves are military-unique. Butyl rubber is the only known material capable of meeting all Service requirements for protection against chemical and biological agents.

The butyl rubber solvent dipping process used to produce the gloves requires unique manufacturing processes and hazardous material recovery equipment. The specialized equipment needed, and requirements for special licenses from the Occupational Safety and Health Administration and the Environmental Protection Agency, discourage entry of new sources.

- Two companies, North Hand Protection and Guardian Manufacturing, have the equipment and licenses required to manufacture butyl chemical protective gloves. Under the terms of an Industrial Base Maintenance Contract (IBMC), each is required to ensure it has sufficient production capacity to meet planned replenishment requirements. (Absent the IBMCs, peacetime production would provide insufficient incentive for the contractors to retain specialized protective glove industrial capabilities. The IBMCs ensure the industrial capabilities are preserved; however, they do not sustain sufficient surge production capacity to overcome inventory shortfalls.)

- The gloves have a shelf-life of 15 years; extended from 5 years as the result of a shelf-life extension program. Even with these extensions, the Department expects significant Service inventory attrition during the next 2-3 years.

- The Department had anticipated that the Joint Services Lightweight Integrated Suit Technology (JSLIST) Program would introduce a new generation glove in 1997. However, the new protective gloves did not meet requirements for military pilots. The 7 mil butyl glove in current use still is required.

- DoD has begun a protective glove pre-planned product improvement program to develop and qualify gloves capable of meeting all requirements. The first new glove was delivered for testing in October 1997. Preliminary indications are that these gloves could be produced on the same production lines being sustained under the IBMC. Testing is expected to extend into April 1999. It is unlikely that a new product could be fielded before 2000.

In April 1997, DLA exercised the last of its one-year IBMC options with North Hand Protection and Guardian Manufacturing (costing approximately $2.2 million per firm). DLA is negotiating follow-on contracts with both firms to sustain industrial capabilities until DoD determines if the new gloves are satisfactory. DLA is considering a contract provision that would provide for the firms to produce protective gloves at a minimum sustaining rate, which would facilitate surge production to overcome inventory shortfalls. The contracts would be for one year, with two option years.

C-130 Propeller System Components (July 1997)

Operational scenarios require that DoD be able to surge production of the C-130 propeller system and selected components. DLA purchases C-130 propeller systems and components for fielded aircraft. Hamilton Standard is the only company certified by the Federal Aviation

Administration to be capable of producing C-130 propellers. It is the sole source producer for the C-130 propeller system. DLA conducted an assessment to determine if it could meet surge requirements.

The assessment concluded that lengthy component lead times, ranging from 26 to 60 weeks, preclude meeting surge requirements. However, prepositioning material could reduce component lead time by an average of 25 weeks; and also reduce inventory carrying costs, logistics operating costs and response times, and administrative/production lead times.

DLA awarded a contract to Hamilton Standard to increase production flow as required to meet all C-130 surge requirements. Under the contract, DLA purchased and prepositioned castings, forgings, and piece parts valued at $3,878,731. This allows Hamilton Standard to surge sufficient material to support three full-time production shifts and ship the items within 45 days.

Chemical Protective Suit Liner Fabric (September 1997)

The Battle Dress Overgarment (BDO) chemical-protective ensemble is out of production and is being replaced by the Joint Services Lightweight Integrated Suit Technology (JSLIST) ensemble. DoD is replacing BDO war reserve inventories with JSLIST ensembles as BDO shelf-lives expire. In 1997, DoD acquired approximately 270,000 JSLIST suits. Four manufacturing facilities, three of which are controlled by the National Industries for the Severely Handicapped (NISH), produce JSLIST suits. (As required by the Javits, Wagner, O'Day Act, the Department awarded NISH 105,000 JSLIST suits in 1997 and expects to award them the same amount in 1998.) The JSLIST liner fabric is manufactured by a sole source firm located in Germany. Von Blucher GmbH owns the patent for the JSLIST suit liner fabric; it has not established a license agreement with a domestic producer. Our NATO allies use the same suit liner for their chemical protective suits. DLA conducted this assessment to determine if current production capabilities are adequate to meet planned sustainment requirements.

The assessment concluded that Von Blucher has sufficient production capacity to meet planned post-conflict replenishment requirements, but would require four months to acquire the raw material needed to produce fabric liner in excess of peacetime requirements. Therefore, absent a "readiness bubble" of fabric liner stored within the continental U.S., DoD would be unable to immediately surge or sustain production above peacetime levels. Quantified surge requirements will be evaluated and developed as the JSLIST suits replace BDOs in the war reserve inventory and the Services identify inventory shortfalls.

DLA awarded a series of liner fabric contracts to Von Blucher GmbH, through its wholly-owned U.S. selling agent, Tex Shield. By February 1998, DLA will have a liner fabric reserve of 185,000 yards, enough to produce in excess of 60,000 JSLIST suits. The contracts also provide for fabric storage, currently in Maine, in close proximity to two of the four manufacturing facilities. DLA is developing a mechanism to rotate the liner fabric reserves into JSLIST production pipelines, ensuring reserve fabric is used before shelf-lives expire. Finally, the Department is seeking substitute technologies which can be inserted into the JSLIST suit to

alleviate any production capacity risks associated with the sole source liner fabric supplier. However, certification of any such technologies could not occur before April 1999.

Heavy Expanded Mobility Tactical Truck Components Follow-On (September 1997)

In August 1996, DLA conducted an assessment to determine if industrial capabilities were sufficient to meet Heavy Expanded Mobility Tactical Truck (HEMTT) filter element peacetime and contingency production requirements. In 1997, DLA, in consultation with representatives of the Army's Tank-Automotive and Armament Command, examined additional HEMTT critical components. (For assessment purposes, critical components were defined to be those war reserve items subject to high peacetime and wartime demand and with relatively long delivery lead times.) The assessment concluded that delivery lead times for these critical components averaged 120 days, too long to meet surge production requirements.

DLA awarded contracts totaling $437,000 to Oshkosh, Prestolite, Hader, BMK Manufacturing, and International Filter. The contracts require the companies to maintain a rotational stock of critical components sufficient to meet contingency operations requirements; this reduces the component delivery lead times from 120 days to 3 days.

Nerve Agent Antidotes in Autoinjectors (November 1997)

Nerve Agent Antidotes (NAAs) in autoinjectors are military-unique items designed for rapid self-administration through clothing upon exposure to nerve agents. DoD uses two styles of autoinjectors: Atropen and Combopen. Both are front-end activation injection devices. Atropen style autoinjectors use a stainless steel cartridge to inject Atropine. Combopen style autoinjectors use a tempered glass cartridge to inject Pralidoxime Chloride and Diazepam. DoD uses "Mark I" Kits to combine Atropine and Pralidoxime Chloride autoinjectors; they're held together by a clip at the safety caps. The antidotes, autoinjectors, and manufacturing processes must be approved by the U.S. Food and Drug Administration (FDA). This assessment, focused on determining if there were sufficient industrial capabilities to meet DoD NAA in autoinjectors requirements, reevaluated assessments performed in April 1996. The assessment concluded:

- Although peacetime requirements are low, NAAs in autoinjectors must be available quickly, in large quantities, in the event of a military contingency.

- Title 10 U.S.C. 2534 restricts the purchase of chemical weapons antidotes contained in automatic injectors, or components for such injectors, to those manufactured in the U.S.

- Quantities required to meet mobilization requirements greatly exceed peacetime needs.

- Meridian Medical Technologies (formerly Survival Technology Inc.), a domestic firm, is the only FDA-approved manufacturer of NAA autoinjectors. In addition to producing the autoinjectors, Meridian also assembles the Mark I Kit.

- Meridian's ability to meet DoD mobilization requirements in the early stages of a contingency is limited by a four month lead time to obtain required autoinjector components and drugs. Additionally, assembly and sterility testing take approximately 7 weeks. Therefore, even if components are available, Meridian cannot ship completed product to the theater until the eighth week of a contingency.

- Meridian is developing a multi-chambered autoinjector that may replace the Mark I Kit. Development and FDA approval will take approximately 2 to 3 years.

DLA awarded Meridian Medical Technologies an IBMC in October 1995, to maintain production capabilities for autoinjectors. In November 1997, DLA exercised the third and final of its one-year options for that contract. Included in the contract is a provision which requires Meridian to purchase and store sufficient components to produce 580,000 Atropine, 490,160 Diazepam, and 1,001,655 Pralidoxime autoinjectors. Since stocking components does not eliminate all shortfalls in meeting contingency requirements, DLA is discussing with Meridian an additional requirement to stock finished goods to further alleviate shortfalls.

Tray Pack Ration Readiness Investment Assessment Follow-on (November 1997)

Tray Pack rations are a member of the family of DoD operational rations; they are used to sustain groups of military personnel in highly mobile field situations. Tray pack components are thermally processed, shelf-stable foods, packaged in hermetically sealed, half steam table-size metal containers. Peacetime quantities are insufficient for continuous production. Prime and subtier suppliers periodically produce sufficient quantities for peacetime requirements, and produce other products in the interim. DoD contingency requirements for Tray Pack rations greatly exceed peacetime requirements. This assessment reevaluated a study performed in May 1996. It compared current industrial capabilities to those required to meet contingency requirements. The assessment concluded:

- The availability of tray pack cans and lids in the early stages of a contingency is the limiting factor in increasing production to meet contingency requirements. Due to low peacetime requirements, the manufacturer maintains only limited quantities of raw materials in stock reserve. The lead time to supply Tray Pack cans to the food processors is eight weeks, including six weeks to obtain raw materials.

- A safety stock of tray cans and lids, rotated through peacetime production, would reduce industry "ramp-up" time to meet DoD contingency requirements.

- Central States Can Company (CSC) is the sole licensed manufacturer of the Tray Pack cans; this makes them uniquely qualified to maintain and rotate the safety stock.

DLA programmed $2.9 million in 1998 to contract with CSC to acquire, maintain, and rotate a safety stock of approximately 1.8 million tray pack cans and lids. Additionally, the U.S.

Army's Soldier Systems Command is testing an alternative container for group feeding. If successful, this would obviate the need for tray pack cans and lids.

Assessment of Meal, Ready-to-Eat Packaging Industry (November 1997)

The Meal, Ready-to-Eat (MRE) is the DoD's "go to war" operational ration, designed to provide individual meals to troops in austere environments. The actual MRE has virtually no commercial counterpart, since commercial products do not meet stringent military nutrient, shelf-life, and packaging requirements. The MRE packaging is a critical element of the MRE. It is designed specifically to meet requirements for durability in transit, storage, and field use; to withstand adverse climatic conditions; to survive airdrops; to resist insect and vermin infestation; and to meet shelf-life requirements. The "Berry Amendment" requires DoD to purchase food grown or produced within the U.S. The requirement has been enacted in permanent legislation [Section 9005 of Public law 102-396, As Amended (10 U.S.C. 2241 Note)]. Consequently, only domestic sources have been used for MREs, including MRE packaging materials. The assessment focused on the commercial manufacturers that laminate and convert rollstock material into military-unique MRE preformed pouches for individual entrees. It was designed to determine if available production capacities were sufficient to meet DoD's peacetime and contingency MRE production requirements. The assessment concluded:

- During the first 60 days of a contingency, war reserve stocks are to be used almost exclusively until the MRE industry can surge production to meet operational requirements which are significantly greater than peacetime production requirements.

- Packaging materials used for MREs are the pacing items that determine the MRE industry's ability to surge production.

- Only three domestic companies laminate and convert rollstock into MRE preformed pouches, and one has recently placed its pouching machine in storage due to low DoD demand. Commercial sales account for the vast majority of the value of packaging supplier sales.

- Packaging manufacturers have implemented "just-in-time" inventory practices, which limit on-hand raw material stocks used in pouch production.

- The lead-time to produce MRE preformed pouches is approximately 6 weeks.

- Current MRE pouch production capabilities are sufficient to meet projected peacetime and contingency individual entree production requirements.

MRE Equipment/Maintenance (November 1997)

DLA conducted this assessment to: (1) reevaluate previous decisions to provide Government Furnished Equipment (GFE) to augment MRE industry production capability for meal bags (which contain individual entrees and condiments) and preformed condiment/accessory bags, and (2) ensure the GFE is placed where DoD would derive maximum production capability. Packaging materials used for MREs are the pacing items that determine the MRE industry's ability to surge production. The GFE consists of two MRE meal bag manufacturing lines and one machine that produces preformed condiment/accessory bags. The GFE is valued at $2.5 million, and is stored and maintained by Cadillac Products, Inc. The assessment concluded that DoD should continue to provide the GFE to Cadillac Products to augment industry production capacity to meet projected operational requirements.

DLA awarded a $42,000 follow-on contract to Cadillac Products to store and maintain two meal bag lines and one condiment/accessory bag machine for MRE components. DLA will continue to evaluate this decision annually.

4.6 Ballistic Missile Defense Organization

Joint Program Office Industrial Assessment for the National Missile Defense System (April 1997)

The National Missile Defense (NMD) system is intended to defend the U.S. against: (1) a limited strategic missile threat by a rogue nation, or (2) a small accidental strategic missile launch. The NMD system is composed of ground-based interceptors, space sensors, ground-based radars, and associated battle management and command, control, and communications equipment. Initial limited system development is projected to be complete in 2000. By 2000, U.S. government leaders will be in a position to determine if the threat warrants deployment. If the decision is to proceed, DoD will deploy an initial NMD system by 2003. This is commonly referred to as the NMD "3+3" development acquisition strategy.

To mitigate programmatic risk, the NMD JPO plans to encourage the use of commercial suppliers and products to the maximum extent feasible. It will:

- Pursue implementation of best commercial practices.
- Utilize commercial off-the-shelf products and non-developmental items.
- Employ an open systems architecture strategy.
- Develop and pursue an acquisition strategy designed to minimize performance, cost, and schedule risk for unique cryogenic components, application-specific integrated circuits, high power amplifiers, and radiation hardened microelectronics.

The NMD JPO conducted a preliminary assessment to determine if industrial and technological capabilities important to the NMD system (that is, those capabilities associated with interceptors, sensors, and communications equipment) would be available when needed. The preliminary assessment concluded:

- The industrial and technological capabilities needed for the NMD system have been subjected to the same broad trends affecting other industrial and technological capabilities needed for defense:

  ◊ Significant reductions in defense procurement funding.

  ◊ Widespread consolidation among major defense contractors.

  ◊ Parts obsolescence in high technology electronic products.

- The NMD JPO may have to take action to mitigate program risks associated with immature manufacturing processes, long lead times, and parts obsolescence.

- Although the NMD system may utilize selected foreign electronic products for reasons of price and efficiency, these will not constitute a foreign vulnerability which poses risks to national security.

- Industrial and technological capabilities are sufficient to meet the requirements of the NMD "3+3" development acquisition strategy. No immediate action is required to sustain essential industrial capabilities, even given expected low production rates.

The NMD JPO will continue to monitor technological and industrial developments affecting the program, as it progresses.

5. Conclusions

Chapter 148, title 10 of the United States Code, establishes Congressional policy designed to ensure the national industrial and technological base will continue to be able to meet the Nation's national security requirements. The Department has established policies and procedures, performed analyses, and taken the actions necessary to:

- Leverage the capabilities and competitive pressures of the commercial marketplace.
- Identify and evaluate those industrial and technological capabilities needed to meet current and future defense requirements.
- When necessary, determine the most cost- and mission-effective actions that the Department should take to preserve endangered essential capabilities.
- Respond appropriately within the Department's regular budget, acquisition, and logistics processes.

In 1997, the Department and its Components performed a series of sector, subsector, commodity , and product assessments. These DoD and DoD Component assessments generally led to similar conclusions. Although the defense industry is experiencing significant reductions and downsizing, there were very few cases where essential capabilities were endangered, even given low production rates. In those few cases, the Department is taking steps to assure essential capabilities will continue to be available.

In 1996, the Department became concerned that vertical integration in the defense industry could have a potential effect on product competition and innovation and asked the Defense Science Board to establish a Task Force on Vertical Integration and Supplier Decisions. In 1997, the task force reported that vertical integration did not appear to be a systemic problem for DoD products today, but might pose future concerns. The task force also recommended a number of steps to address such concerns. DoD endorsed task force findings and began a series of policy and procedural changes to improve its ability, in its ongoing acquisition processes, to address problems that may emerge from increased vertical integration.

DoD also began to evaluate and address changes in key component and material providers which supply many programs, affecting competition and innovation, and product availability. The Department evaluated industry segments which supply microwave power tubes and carbonizable rayon fiber. In each case, DoD and the appropriate agency established mechanisms to ensure that industry restructuring in response to reduced spending would not impact DoD's ability to meet future mission requirements.

In response to Congressional inquiries, the Department performed broad assessments related to foreign supplier participation in DoD aircraft landing gear and instrumentation recorder acquisitions. After examining landing gear acquisitions between 1992 and 1996, the Department concluded there was no indication that U.S. landing gear companies are facing major foreign,

government-subsidized competition. DoD's review of current and planned information systems incorporating instrumentation recorders concluded that: (1) although foreign recorders sometimes are used in classified applications, DoD Components have procedures in place to guarantee the security of the defense system, and (2) DoD's use of foreign recorders does not compromise national security.

Generally, DoD Component intervention actions have been limited to preserving selected capabilities for which DoD peacetime requirements are limited, and projected military contingency requirements are significantly larger. In such cases, DoD Components have restricted competition in a solicitation, for mobilization base reasons, to domestic sources and/or acquired and maintained facilities, equipment, or materiel needed to meet projected military contingency (surge and replenishment) requirements.

Additionally, DoD Component program offices continue to monitor industrial and technological developments affecting individual programs, and take appropriate action to mitigate program risk.

The Department will continue to work to ensure that essential defense industrial capabilities are available to the Department as it prepares to move into the 21st century.